PATENT ABSTRACTS OF JAPAN

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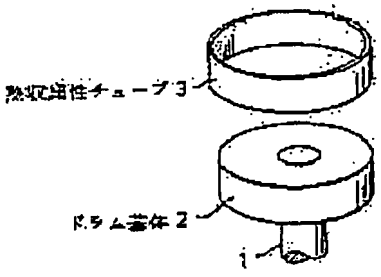
(54) MAGNETIC DRUM

(57)Abstract:
PURPOSE: To achieve a production of a magnetic drum simply and in a short time by a method wherein a heat shrinkable tube mixed with a specified range of magnetic particles is thermally shrunk to be fixed on the outer circumference of a non-magnetic drum base body and the magnetic particles within the heat shrunk tube are magnetized as specified.
CONSTITUTION: A magnetic drum has a non-magnetic drum base body 2 mounted on a rotating shaft 1 and a heat shrinking tube 3 mixed with magnetic particles is fitted securely onto the outer circumference of the drum base body 2 by a heat shrinkage. The amount of the magnetic particles mixed into the heat shrinking tube is preferably 20-80wt.% because a specified magnetization is hard to achieve below 20wt.% while a drop in strength and shrinkage occurs above 80wt.%. The magnetic particles herein used is γ-Fe2O2, Co-γFe2O3, Br-ferrite, metal powder or the like and an average particle size thereof is 2.5μm.



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審査請求 未請求 請求項の数 2 (全3頁)

⑭発明の名称 磁気ドラム

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明 細 書

1. 発明の名称

磁気ドラム

2. 特許請求の範囲

(1) 磁気抵抗素子により回転速度あるいは位置等を検出できるように外周に着磁部を設けた磁気ドラムにおいて、磁性粒子を混入した熱収縮性チューブが熱収縮により、非磁性のドラム基体外周に固定され、熱収縮性チューブの磁性粒子が着磁されていることを特徴とする磁気ドラム。

(2) 熱収縮性チューブは、磁性粒子が20wt%～80wt%含まれていることを特徴とする請求項(1)の磁気ドラム。

3. 発明の詳細な説明

「産業上の利用分野」

本発明は、磁気抵抗素子により回転速度や位置を検出できるように外周に着磁部を設けた磁気ドラムに関し、特にその製造を容易にしたものである。

「従来の技術」

従来の磁気ドラムは、第2図に示すように、回転軸にドラム基体が取付けられ、ドラム基体の外周面には、ヶ所等の磁性塗膜を設けて、NS磁極が交互に出現するように着磁されている。

ドラム基体の外周に磁性塗膜を設ける場合には、第1次磁性塗料を塗布した後、約60℃で30分乾燥させ、再び第2次磁性塗料を塗布し、約60℃で30分乾燥し、次いで200℃で約120分乾燥させることにより、着磁に望ましい厚さ約100～150μmの磁性塗膜を得るようにしていた。

そして上記磁気ドラムの回転速度を検出させる場合には、磁気抵抗素子を磁気ドラムの磁極面に対向させ、磁気ドラムの回転速度に応じた磁気変化により、磁気抵抗素子が磁気信号を生じるようになっている。

「発明が解決しようとする課題」

従来の磁気ドラムは、磁性塗料を塗布した後、乾燥させる工程を2度行なうことにより磁性塗膜を形成しているので、その作成時間が長くなり、

製造効率がよくなかった。

また磁性塗料の乾燥時に、異物が入り込みやすく、かつまた磁性塗料を２度塗布するので気泡が残りやすく、磁気ドラム外周への着磁に誤差が生じるという問題があった。

そこで本発明は、磁気ドラムの製造効率を向上するとともに、磁気ドラム外周に均一な磁性層を形成して、着磁に誤差が生じないようにすることを目的とする。

「課題を解決するための手段」

本発明の磁気ドラムは、磁性粒子を混入した熱収縮性チューブを熱収縮させることにより、非磁性のドラム基体外周に固定し、熱収縮チューブ内の磁性粒子に所定の着磁をしたものである。

熱収縮性チューブに混入する磁性粒子は、２０wt%以下では所定の着磁を得にくく、８０wt%以上では熱収縮性チューブの強度および収縮性が低下するので、２０～８０wt%混入させるのが望ましい。

「作用」

上記手段の磁気ドラムでは、磁性粒子を混入した熱収縮性チューブを非磁性のドラム基体の外周に嵌合して、熱収縮性チューブを加熱することにより収縮させれば、ドラム基体を強くしめつけて固定でき、その後チューブ内の磁性粒子を着磁すれば着磁部が作成される。よって、磁性粒子を混入した熱収縮性チューブを前もって作成しておけば、それを加熱するだけで着磁部が完成し、その製造が簡単であって短時間に作成できる。また、収縮性チューブを加熱収縮させる工程では、異物が入り込むことはなく、気泡も入り込むことがない。

「実施例」

本発明の実施例を第１図により説明する。

磁気ドラムは、回転軸１に非磁性のドラム基体２（例えばAl製）が取付けられ、このドラム基体２の外周に、磁性粒子を混入した熱収縮性チューブ３が嵌合され加熱収縮により固定されている。

磁性粒子としては、γ－Fe_2O_3、Co－γFe_2O_3、Ba－フェライト、メタル粉等が使用され、それらの平均粒径は2.5 μmのものを使用した。熱収縮性チューブ３としては、ポリオレフィン、エチレンプロピレン系エラストマー、シリコンゴム等が材料として使用される。そして熱収縮性チューブ材に前記磁性粒子を４０～７５wt%と、酢酸セロソルブを添加して撹拌し、さらに硬化樹脂を添加して厚さ約0.2 mmの熱収縮性チューブ３を作成する。

このように作成した熱収縮性チューブ３を、ドラム基体２に応じた軸方向長さに切断して、ドラム基体２の外周に嵌合し、約１２０℃に加熱すれば外径が約４０％収縮してドラム基体２の外周に強く固定される。なお、熱収縮性チューブ３の径は、ドラム基体２の外径より約３０％大きく形成しておくのが望ましい。

前記のように着磁部を形成した後、熱収縮性チューブ内の磁性粒子に所定の着磁をすれば、磁気ドラムが完成する。

「発明の効果」

本発明の磁気ドラムは、着磁部が、磁性粒子を混入した熱収縮性チューブにより形成されるので、その製造を簡単かつ短時間に行なうことができる。また、その製造時に異物が入り込んだり、気泡が生じることがないので、着磁に誤差を生じさせることがなく検出誤差をなくすことができる。

4．図面の簡単な説明

第１図は本発明の磁気ドラムの分解斜視図、第２図は従来の磁気ドラムの斜視図である。

２：ドラム基体　　３：熱収縮性チューブ

出願人　日立金属　株式会社

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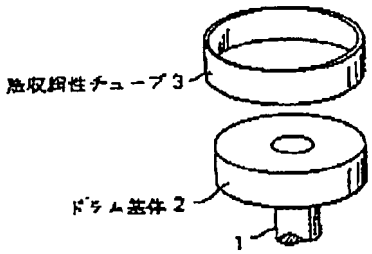
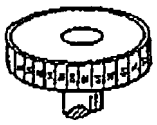
第 1 図



第 2 図



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(54) Title of invention Magnetic drum

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Specification

1. Title of the invention

Magnetic drum

2. Scope of the patent claims

(1) A magnetic drum having a magnetized section disposed on the outer circumference thereof in such a way as to enable rotational speed or direction, etc. to be detected by means of magnetoresistive elements, said magnetic drum comprising a heat shrinkable tube containing magnetic particles fitted to the outer circumference of a non-magnetic drum substrate by means of heat shrinkage and the magnetic particles of the heat shrinkable tube being magnetized.

(2) A magnetic drum as disclosed in claim 1, wherein the heat shrinkable tube contains 20 – 80 weight percent magnetic particles.

3. Detailed description of the invention

(Field of industrial utilization)

The present invention relates to a magnetic drum having a magnetized section disposed upon the outer circumference thereof in such a way as to detect rotational speed and position by means of magnetoresistive elements and, more specifically, relates to such a magnetic drum which is easier to manufacture.

(Prior art)

In conventional magnetic drums, a drum substrate is mounted on a rotating shaft and a magnetic film such as gamma-iron is disposed on the outer circumferential surface of the drum substrate and magnetized so that North and South magnetic poles occur alternately, as shown in Fig. 2.

To dispose the magnetic film on the outer circumference of the drum substrate, a first magnetic coating is applied and then dried at approximately 60°C for 30 minutes, following which a second magnetic coating is applied and then dried at approximately 60°C for 30 minutes, subsequent to which drying is conducted at 200°C for approximately 120 minutes to obtain a magnetic film with a desired depth of approximately 100 - 150μm for magnetization.

To detect the rotational speed of the magnetic drum, magnetoresistive elements opposing the magnetic pole faces generate electrical signals based on the changes in magnetism in accordance with the rotational speed of the magnetic drum.

(Problems to be solved by the invention)

In conventional magnetic drums, since the magnetic film is formed by conducting the drying process twice after applying the magnetic film, the preparation of the film is time-consuming and manufacturing efficiency is poor.

Additionally, it is easy for foreign bodies to enter the magnetic coating during the drying process and, since the coating is applied twice, it is also easy for air bubbles to remain, thus giving rise to the problem of errors in the magnetization of the outer circumference of the magnetic drum.

It is therefore an object of the present invention to improve the manufacturing efficiency of magnetic drums as well as to prevent the occurrence of errors in

magnetization by forming a uniform magnetic film on the outer circumference of the magnetic drum.

(Means for solving the problems)

In a magnetic drum of the present invention, a heat-shrinkable tube containing magnetic particles is fitted to the outer circumference of a non-magnetic drum substrate by means of heat shrinkage and the prescribed magnetization is applied to the magnetic particles within the heat shrinkable tube.

If the magnetic particles are mixed within the heat shrinkable tube at a concentration of less than 20 weight percent, it will be difficult to achieve the prescribed magnetization, while a concentration in excess of 80 weight percent will diminish the strength and shrinkability of the heat shrinkable tube. A mixture of 20 – 80 weight percent is therefore desirable.

(Operation)

In a magnetic drum of the abovementioned means, a heat shrinkable tube containing magnetic particles is fitted onto the outer circumference of a non-magnetic drum substrate and heat is applied to the heat shrinkable tube enabling the tube to grip tightly to the drum substrate, following which a magnetized section is produced by magnetizing the magnetic particles within the tube. Accordingly, if a heat shrinkable tube containing magnetic particles is prepared in advance, a magnetized section can be completed simply by heating the heat shrinkable tube and it is therefore both simple and quick to manufacture. Furthermore, no foreign bodies will enter or air bubbles occur during the process of heat-shrinking the heat shrinkable tube.

(Embodiments)

An embodiment of the present invention will now be described with reference to Fig. 1.

A non-magnetic drum substrate 2 (for example, of Al manufacture) is mounted on a rotating shaft 1 and a heat shrinkable tube 3 containing magnetic particles is fitted to the outer circumference of the drum substrate 2 and fixed by means of heat shrinkage.

Gamma-Fe_2O_2, Co-gamma-Fe_2O_2, Br-ferrite or metal powder, etc. are used for the magnetic particles and the average diameter of these particles is 2.5μm. A material such as polyolefin, ethylene-polyethylene elastomer or silicon rubber is used for the heat shrinkable tube 3. The magnetic particles at 40 – 75 weight percent and cellosolve

acetate are then added to the heat shrinkable tube material and stirred, following which curing resin is added to produce a heat shrinkable tube 3 with a thickness of approximately 0.2mm.

The heat shrinkable tube 3 thus produced is cut to the appropriate length for the drum substrate 2 in the axial direction, is fitted to the outer circumference of the drum substrate 2 and when heated at approximately 120°C the external diameter contracts by approximately 40% to fix the tube tightly to the outer circumference of the drum substrate 2. It is desirable to produce a heat shrinkable tube 3 with a diameter approximately 30% greater than the external diameter of the drum substrate 2.

After forming the magnetized section as described above, the magnetic drum is completed by applying the prescribed magnetization to the magnetic particles within the heat shrinkable tube.

(Effect of the invention)

In a magnetic drum of the present invention, the manufacturing of the drum can be simplified and the time required for manufacture reduced because the magnetized section is formed by a heat shrinkable tube containing magnetic particles. Moreover, because no foreign bodies enter or air bubbles occur during manufacture, errors in magnetization will not occur and detection errors can be eliminated.

4. Brief description of the drawings

Fig. 1 is an exploded perspective view of a magnetic drum of the present invention. Fig. 2 is a perspective view of a conventional magnetic drum.

2: Drum substrate

3: Heat shrinkable tube

Applicant: Hitachi Metals Ltd.

Representative: Katsuji Maki, Patent Attorney

[drawings]

Fig. 1

Heat shrinkable tube 3

Drum substrate 2

Fig. 2